
INVESTIGATING THE IMPACTS OF CLIMATE CHANGE ON HUMAN LIVES AND THE ENVIRONMENT FOR EFFECTIVE ADAPTATION AND MITIGATION STRATEGIES

By

DR. VERONICA NGOZI DURU

*Department of Curriculum Studies and Educational Technology,
Faculty of Education,
Imo State University,
Owerri.*

Abstract

This paper investigated the impacts of climate change for effective adaptation and mitigation strategies to climate. Two research questions and one hypothesis guided the study. The survey descriptive design was adopted in which questionnaire was used to elicit information from the respondents. Two universities were involved. The population of the study was 364 which includes lecturers from the faculties of Environmental Science, Agricultural Science and Natural Science. A total sample of 157 lecturers were selected from the population through simple random sampling technique. The instrument used was a structured questionnaire which consisted of 28 items. The instrument was validated and the reliability calculated which was 0.74 which indicates that the instrument was reliable to collect data for the study. Mean scores and standard deviations were used to answer the research questions while the hypothesis was tested at 0.5 level of significance. The result of the study show that respondents generally agreed on all the items listed on the table 1 and table 2 as the impacts of climate on man and table 2 as the adaptation and mitigation strategies to climate change. Result of the study on table 3 revealed that there is no significant difference between the opinion of male and female lecturers on the effective adaptation and mitigation strategies to climate change. Based on these findings, recommendations were made, one of which is that Teachers, Educators, and other stakeholders in government and Education should create awareness on climate change and environmental threats through Education at all levels, through media, seminars, conferences and workshops.

According to UNESCO climate initiative (2010), climate change has become the more dominant and crucial issue in the Educational literature of the recent time. The current warming trend of the earth's atmosphere that started with industrial revolution has a lot of unusual climate conditions. Some of these unpredicted changes as enumerated by Eheazu (2011) include seasonal sea ice at the earth's pole, rising sea level, shift in precipitation patterns, leading to extended drought, excessive rainfall, flooding, erosion and more frequent extreme weather events. These myriads of effects of climate change and Global warming have awakened the thought of many educators, scientists and many environmentalists as how to address this greatest challenge of our time.

Expressing concern on climate change and its effects on the world today, UN secretary, Ban Kimoon in 2010 during the UNESCO climate change initiative declared climate change a complex problem because of the way it is intertwined with many issues such as Economic Development and Poverty reduction.

He stated that climate change is a global problem and yet each of us has the power to make a difference. He added that even small changes in our life style and behavior can help reduce green house gas emission while ensuring a minimum quality of life. Concerning the solution to this great challenge UNESCO stated that progress is needed on many fronts; development and transfer of green technologies, greenhouse gas emission reductions and establishment of effective government policies. It was also suggested that it is of equal importance to provide education and training and promote public awareness to the broadest audience possible. He stated that the need to create an informed global citizenry, a knowledge workforce, and enlightened government officials on their roles in climate change mitigation and adaptation is immediate.

Here in Nigeria, many educators have expressed serious concerns on the impacts of climate change on human lives and the environment. Eheazu 2011 reported that no part of the country is free from devastating effect of climate change. He stated that excessive rain and flood have rendered many families homeless both in the western, eastern, southern and northern part of Nigeria. There are also cases of loss of lives and properties as a result of excessive flood and erosion. From his reports, it is not an overstatement to state that Nigeria is one of the developing countries which is vulnerable to effects of climate change. Eheazu (2011) identified some of the effects of climate change on human existence as unprecedented rainfall and drought, rise in temperature, melting of ice at the poles, rise in sea levels due to melting of ice and rise in temperature etc.

Expressing fear over the impacts of climate change on human lives and the environment, Nwoko (2013) stated that in this 21st century, it is likely that there would

be faster and a bigger change in the way life is lived. There would be more greenhouse gas emission and more changes in the global weather, precipitating to environmental catastrophes of flooding, rising sea levels, cold weather, drought and global warming. No doubt such would be the magnitude of the climate change challenges.

Still on the impact of climate change, Mkpa (2012) reported increased heavy precipitation events, and flooding decreased drinking and fresh water supplies and availability, glacier melt decline, etc. On ecosystem, he reported massive extinctions, animal and plant migration, increased wild fires, and drought, increased flooding, decreased frost coverage and its effects is more worrisome because we are in the period of global challenge of accomplishing the millennium development goals (MDGs) which centers on seven objectives on issues paramount to sustainability of lives. The question is therefore, how can sustainability be achieved at the face of unprecedented effects of global warming and climate change? How can poverty be reduced when there are still cases of lost lives and poverty creation? How can poverty be reduced when there are still cases of loss of lives and poverty creation?

The global challenge is said to be hydra-headed, to accomplish MDGs while reducing dependencies on carbon (which is the primary cause of GW and CC) promoting climate resilience and ensuring balanced economic development. The researcher is therefore worried over the present situation and is therefore poised to investigate the more effective mitigation and adaptation strategies to climate change.

Statement of the Problem

From the UNESCO climate change initiative, climate change has become the more dominant and crucial issue in the education literature of the recent time. In both developed and developing countries, there has been overwhelming evidences of its impacts on human lives and the environment. Apparently man has been identified as having the major share of causes of climate change through his economic activities yet man is still not well informed of how to cope or reduce its effects (UNESCO 2010). Climate change is a complex problem that requires a complex solution. Ban Kimoon (2010) in his speech during the conference of climate change initiative stated that climate change is a global problem yet each of us has the power to make a difference by making a small change in our life style and behavior in order to reduce greenhouse gas emission while ensuring a minimum quality of life. It is based on this premise that the researcher is motivated to investigate the more effective adaptation and mitigation strategies to climate change. The problem of the study can be stated thus: (1) What are the impacts of Climate Change on human lives and environment? (2) What are the effective adaptation and mitigation strategies to climate change?

Conceptual Issues

Global climate change as explained by Nwoko (2013) refers to the repetition pattern of weather and represents the average weather condition over long period of time. The shift can bring about warmer or cooler temperature, higher or lower humidity and stronger or weaker winds. Concerning the causes of climate change, Nwoko stated that fossil fuels have provided a substantial share of industrial fuels in power production and its combustion is a substantial cause of greenhouse gas effect through the emission of carbon dioxide, nitrogen oxides and other greenhouse gases. Simply put, the wealth and affluence +created through fossil fuel powered industrialization has resulted in the emission of greenhouse gas with large quantity of concentration in atmosphere triggering global warming and subsequently causing the climate change.

Tall Bloke's talk shop (2013) explained climate change as changes in earth climate system that take place over decades or longer periods of time. Wiggins and Wiggins (2006) explained climate change as any significant change in world climate over time. Global climate change is considered to be synonymous with global warming which is significant increase in the temperature of the earth's atmosphere due to greenhouse gas in the atmosphere. Thus Global warming gives rise to global climate change.

Adaptation and Mitigation

Adaptation is the action or process of adapting or being adapted. It is the process of change by which organisms become better suited by its environment or become adjusted to its new environment. (Okeke 2013) explained adaptation to climate change as longer term strategies which deal with climate change in contrast to short term coping strategies. He further explained that Adaptation is adjustment in natural or human systems which moderates the harm or exploits beneficial opportunity associated with climate change. Adaptation he stated is usually a longer term livelihood activity and is a continuous process where results are sustained.

Mitigation according to online dictionary is the act of moderating a quality or condition in force or intensity to alienate. Mitigation can also be explained as the effort to reduce loss of lives and property by lessening the impact of disasters. It can be viewed from the point of risk analysis and risk reduction. With regard to climate change and global warming mitigation is the action to decrease the intensity of radioactive forcing in order to reduce the effects of global warming. Mitigation strategies are those activities that can be undertaken by human to control or reduce the effect of global warming and climate change. Example reduction of the rate of use of fossil fuel that leads to production of carbon dioxide in the atmosphere.

Objectives of the Study

The main objective of the study is to ascertain the effective adaptation and mitigation strategies to climate change. Other specific objectives include:

1. To investigate the impacts of climate change on human lives and the environment.
2. To find out if there is significant difference in the mean response of male and female lecturers on the effective adaptation and mitigation strategies.

Research Questions

The researcher posed two research questions to guide the study. They are as follows:

1. What are the impacts of climate change on human life and the environment?
2. What are the effective adaptation and mitigation strategies to climate change?

Hypothesis

One null hypothesis was formulated by the researcher to guide the study which is stated thus:

1. There is no significant difference in the mean response of male and female lecturers on the effective adaptation and mitigation strategies to climate change.

Research Design and Procedure

The study investigated the impacts of climate change to human life and the environment for effective adaptation and mitigation strategies to climate change in Owerri Educational Zone of Imo State. A descriptive survey design was adopted by the researcher in which opinion of University lecturers were sought based on the information required in the research questions and also based on the objectives of the study.

The population of the study was 364 academic staff in the department of Environmental Science, Agricultural Science and Natural Science in the two Universities selected for the study. From a total population of 364 lecturers, a purposive and random sampling technique were used to select 157 lecturers as the sample for the study.

The instrument used for the study was a structured questionnaire titled Climate Change, Impacts, Adaptation and Mitigation Strategies Questionnaire (CCIAMSQ). The instrument consisted of two sections A & B. While section 'A' was on students' demographic factors, section B was organized in two clusters; A & B based on the information required in the two research question respectively. The instrument was based on a four point likert scale with weights attached to the responses as follows: Strongly Agreed (SA) = 4, Agreed (A) = 3, Strongly Disagreed (SDA) = 2 and Disagreed (DA) = 1.

The rule used to distinguish between positive and negative responses was the average of a four point likert scale which is 2.50. Any mean score up to and above 2.50 is regarded as positive response while any mean score below 2.50 is regarded as negative response. The instrument was validated by two experts from the department of measurement and evaluation. The 28 items contained in the questionnaire were screened thoroughly for face and content validity. The experts made some corrections and with these corrections some items were modified to reflect the objective of the study while a few items were expunged and replaced with more relevant ones. In this way validity was ensured. The reliability of the instrument was calculated to be 0.74. The procedure used was test-retest method in a pilot test whereby the instrument was administered to group of respondents who were not enlisted for the study but were from the same faculty of environmental Science, Agricultural Science and Natural Science. After an interval of two weeks the same instrument was administered to the same group of respondents. The two sets of scores were correlated using Pearson Product Moment Correlation Formula and a Correlation Coefficient of 0.74 was obtained which indicates that the instrument is reliable enough to collect data for the study. The researcher personally distributed the questionnaire to the respondents with the help of two research assistants who collected them as soon as they were completed by the respondents. The method of data analysis was mean scores and standard deviations for the research questions while t-test statistics was used to test the hypothesis at 0.05 level of significance. The rule for the acceptance of the hypothesis was that t-calculated must be greater than the value of table-t at 0.05. If otherwise the null hypothesis was rejected.

Results

Research Question I

What are the impacts of climate change on human life and the environment?

Table I: Mean Scores and Standard Deviations of Respondents on the Impact of Climate Change (CC -)

What is your perception on the following as the impacts of climate change on human lives and environment	N	\bar{X}	SD
1. There is global rise in temperature and the earth becomes unusually warmer	157	2.84	0.80
2. Fluctuation in temperature will lead to excessive rainfall or excessive drought	157	2.89	0.64
3. Temperature rise leads to melting of ice in the poles resulting in sea level rises and flooding which is already affecting vulnerable low lying islands and coastal areas	157	2.91	1.12
4. Increase in temperature produces significant effect	157	3.07	0.63

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	on ecosystem			
5.	Biomes expand their range into locations where the climate is favourable and disappear from locations where the climate is less favourable	157	3.13	0.57
6.	Unfavourable climate will lead to migration of people from affected areas to new environment thereby creating environment refugees.	157	3.22	0.90
7.	Biodiversity loss: Climate change will lead to loss of all forms of living organism such as fungi protozoa, bacteria, plants, insects, birds e.g within the environment	157	3.41	0.27
8.	Human environment such as houses, market squares, church buildings will be destroyed by excessive rainfalls and associated flood/erosion	157	3.49	0.82
9.	School blocks infrastructures landscapes and trees will be seriously affected by excessive rainfall and flood	157	3.62	0.43
10.	There is possibility of reduction of Agricultural yields due to excessive rainfall or drought or even destruction of such yields by pest	157	3.70	0.31
11.	Fishery which supports human life is liable to decline as a result of excessive rain or drought	157	3.72	0.54
12.	Tourism industry could hit decline and fresh water supply could lose quality	157	3.81	0.18
13.	Many global inhabitants live in the coastal regions and so rising sea levels could destroy homes and other civil infrastructures	157	3.90	0.14
14.	Road networks in the developing areas will be serious affected by excessive rainfall, flood and erosion	157	2.80	1.02
15.	Local and international Flights will in most cases be obstructed by bad weather and there may be loss of lives as a result of plane crashes`	157	2.65	1.12
16.	There could be epidemic of different water and air borne diseases as a result of unfavourable weather conditions	157	2.62	1.24
17.	Climate change could hamper the ability of developing countries to attain their poverty reduction and sustainable development objectives under the United Nations Millennium Development Goals (MDGs)	157	2.58	0.72

Table I above shows that all the items listed (1-17) have mean scores greater than 2.50 used as the minimum score for positive response. The implication is that respondents generally agreed on the items as the impacts of climate change on human life and the environment.

Research Question 2

What are the effective adaption and mitigation strategies to climate change.

Table 2: Mean Scores and Standard Deviations of Respondents on Effective Adaptation and Mitigation Strategies

Male 63, Female =94

What is your perception on the following as the effective Adaptation and Mitigation strategies to Climate Change?		Male Lecturer X	Male Lecturer SD	Female Lecturer X	Female Lecturer SD
1	Promoting Education public awareness and training on climate change	3.32	0.71	3.32	0.93
2	Encouraging Education on climate change at all levels both at all formal and informal settings for instilling of climate change awareness and understanding at a young age for change of behaviour and attitude because what children learn today will shape tomorrow's world.	3.68	0.57	3.68	0.47
3	Promoting effective integration of climate change into Educational programme and school curricular even in adult/ mass literacy programmes and mobilizing support for teacher training on climate change, education, identifying and encouraging use of learning materials and good practices on climate education.	3.48	0.73	3.49	0.50
4	Disseminating of learning materials and practices via information and communication strategy	3.32	0.83	3.32	0.77
5	Identifying opportunities for using various networks such as UNESCO Associated school network .encourage local field based education on climate change.	3.17	0.92	3.45	0.71
6	Organizing seminars, workshops, conferences for Educators and stakeholders of Education, Health, Agriculture and other sectors for knowledge of climate change and its impacts.	3.60	0.49	3.51	0.62
7	Reducing the rate of felling trees for Timber business or fire wood or for farming preparation as these activities increase the amount of CO ₂ in the atmosphere.	3.25	1.05	3.57	0.49
8	Controlling the depletion of ozone layer by human activities such as gas flaring, use of fossil fuels, burning of coal etc	3.20	0.81	3.60	0.49
9	Controlling human activities that lead to production of fluorinated compounds CFC2.	3.53	0.74	3.45	0.71

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10	Reducing the rate of Agric pollutants by controlling the human activities that lead to its production example use of insecticides, pest control, and other pollutants.	3.40	0.73	3.55	0.71
11	Ensuring proper disposal of refuse and avoid littering of garbages polythenes, papers, cans that can lead to over flowing of street gutters and floods. Some of these containers can be re-used or re-cycled.	3.68	0.46	3.55	0.71
		37.63	8.01	38.49	7.11

The result of finding in table 2 above shows that all the calculated mean responses on the effective adaptation and mitigation strategies are greater than 250 which is the minimum acceptable mean for positive response. This indicates that respondents generally agreed on the items listed (1-11) as the effective adaption and mitigation strategies.

Null Hypothesis: There is no significant difference between the mean response of male and female lecturers on the effective adaptation and mitigation strategies to climate change.

Table 3: T-Test Analysis of No Significant Difference between the Mean Responses of Male and Female Lecturer in Their Perception about Adaptation and Mitigation Strategies

Gender	N	X	SD	Df	Cal-t	Table t	Sig T	Dec
Male lecturers	63	37.63	8.01	155	0.69	1.96	0.05	NHNR
Female	94	35.49	7.11					rejected

NHNR = Null Hypothesis not rejected

Result of finding on Table 4: show the mean and standard deviation scores of response of male and female lecturers on their perception about effective adaptation and mitigation strategies. The calculated t-value of 0.69 is less than the t-table value of 1.96 at 0.05 level of significance Therefore the null hypothesis of no significant difference between male and female perception was not rejected.

Discussion of Findings

The study investigated the impacts of climate change to human lives and the environment. It also investigated the effective adaptation and mitigation strategies to climate change.

With regard to research question one, the study revealed that climate change constitute a big threat to human lives and the environment. This was indicated by high mean scores of all the items on the perception of lecturers on impacts of climate change on human lives and the environment. The mean range is 3.58 – 3.90 which shows

strong agreement on the part of respondents (see table 1, item 1-17). The finding is in line with assertion of Mkpa (2013) on impacts of climate change on human lives. He enumerates a long list of unfavorable conditions such as drought, increased heavy rainfall, flooding, erosion, massive extinction of plants and animals, destruction of properties etc. Duru (2013) and Nwoke (2013) noted that man is responsible for the cause of this climate change to a reasonable extent. One wonders on the level of awareness to be created in order to enable the public realize the magnitude of their activities that cause climate change.

With regard to research question two which addressed the effective mitigation and adaptation strategies to climate change, the study revealed that there are different ways of adapting and mitigating the impacts of climate change. This was supported by high mean scores of the perception of lecturers on the items listed in table two, (1-11). All the mean scores are greater than 2.50 used as the minimum acceptable mean score for positive response. The mean range for male is (3.20-3.68) while female is (3.32-3.68). The finding is in agreement with adaptation and mitigation strategies given by Okeke (2013), Offorma (2013) and UNESCO (2010). They listed some mitigation and adaptation strategies which mainly rest on using education to get the public informed of the causes and impacts of climate change to human lives. According to UNESCO, if every one can make small change in our life style and behavior, we can reduce greenhouse gas emission while ensuring a minimum quality of life. Mkpa stated that if we can reduce the rate of burning fossil fuel and the rate of production of carbon dioxide, nitrogen oxides and other greenhouse gases, we are sure of mitigating the impact of climate change in human lives and environment.

Concerning the null hypothesis which stated that there is no significant difference between the mean perception of male and female lecturers on the effective migration and adaptation strategies to climate change, t-test analysis revealed that there is no significant difference in the mean perception of both male and female lecturers. This is supported by low value of calculated t (0.69) at 0.05 level of significance $t_{cal} < t_{table}$ ($0.69 < 1.96$). The implication is that both male and female lecturers generally agreed on the adaptation and mitigation strategies listed on table 3. Based on the finding that $t_{cal} 0.69 < t_{table} 1.96$, the null hypothesis was not rejected.

Conclusion

The study concludes that climate change has a lot of impacts on human lives and the environment and these impacts can be reduced or adapted to if man can reduce the rate of production of carbon and other greenhouse gases and also adjust his lifestyle to reduce those activities that cause production of greenhouse gases and damage to environment.

Recommendations

Based on the findings of the study the researcher recommends as follows:

1. That the impacts of climate change identified should be made known to the general public through public lectures, media, workshops, seminars and conferences.
2. That the adaption and mitigation strategies identified by this study and others should be integrated into the existing school curriculum in all levels and different subjects.
3. Films, charts and other ICT materials on the impacts, adaption and mitigation strategies should be produced and distributed to general public.
4. That government should promote public awareness to the broadest evidence possible on the impacts, adaptation and mitigation strategies through the use of well packaged ICT materials such as films, slides power points, posters, etc. \
5. Teachers should be retrained on the causes, impacts, adaptation and mitigation strategies so as to teach the learners in school.

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